

STUDIES ON THE PLECOPTERA OF NORTH  
AMERICA. IV. FURTHER NOTES  
ON THE CAPNIIDAE.\*

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Frison has recently published several excellent new papers on Plecoptera. I have been prompted, however, by disagreement with some of his conclusions concerning Capniidae, to comment here upon the matter, especially as concerns certain conclusions, expressed in his most recent paper, which are considerably different from mine as expressed in the preceding article (Part III) of this series.

In a discussion (1942a) of his opinions concerning the status of certain species of *Allocapnia*, Frison has attempted to clear up the problem of the identity of *Allocapnia pygmaea* (Burm.) and *Allocapnia nivicola* (Fitch). It appears, however, that further confusion of synonymy may have been the result.

The species which he now considers to be *A. pygmaea* appears not to be the species so considered by Needham and Claassen, who are the only American workers who have critically studied the types of this species. The male of the species which he figures seems to be very closely related to *A. nivicola* while the female resembles *A. pygmaea*. His adoption of Hagen's (1861) synonymy of *A. nivicola* under *A. pygmaea* seems also to be incorrect since, as determined by his own designation of lectotypes of *A. nivicola*, this species is not identical with the one which he considers to be *A. pygmaea* nor with this species as defined by Needham and Claassen.

I have thought it advisable to include here also some further notes on our eastern species of *Capnia* and on *Isocapnia* in the hope of lending additional clarity to recent synonymical designations in these genera.

*Allocapnia pygmaea* (Burmeister). Figs. 1, 2.

1839. *Semblis pygmaea* Burmeister ♂, Handb. Ent., 2(2): 874.

1925. *Capnella* Needham & Claassen ♂ ♀, Plecop. Amer. North of Mex., pp. 277-278 (redescribed and figured after study of the type).

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1935. *Allocapnia torontonensis* Ricker ♂ ♀, Can. Ent., 67: 257, figs. 14-16 of ♂.  
1942. *A pygmaea* in part (♀), Frison, Bull. Ill. Nat. Hist. Survey, 22(2): 265-268, fig. 33 of ♀ (*A. torontonensis* synonymized).

Needham and Claassen (1925) in studying the original cotypes of *Allocapnia pygmaea* (Burm.) which are in the Berlin Zoological Museum found only two males among them. One of these was *Allocapnia recta* (Clns.); the other they considered to be the type of *pygmaea*. Until this specimen can be critically restudied we obviously must accept the opinion of these workers as to the identity of *pygmaea*. A study either of their monograph or of their identified material in the Cornell collection leaves no doubt as to their conception of *pygmaea*.

A complete study of the Cornell collection shows that out of slightly over 500 specimens labelled as *pygmaea* about 98% are of a single species. The few specimens not of this species consist of several species distributed in three different families. Usually these miscellaneous species were found in vials containing many specimens of *pygmaea*. It is apparent therefore that Claassen did not study every specimen in a given series but was content with identifying only a few and then assuming that the rest were the same. We are forced to this conclusion, since in no other manner could he have placed such widely differing species under a single species label. Thus, it can be stated that the predominating species in any given vial of Cornell material corresponds in all probability with Needham & Claassen's conception of the identity of the species.

There is no doubt that the species treated as *pygmaea* by Needham & Claassen in their monograph is the same as the identity that I have arrived at through a complete restudy of their material. Their key, description, and figures demonstrate several diagnostic features which serve to distinguish it from other species of the genus with which it might be confused. Nevertheless, since their work has been misconstrued, it seems advisable to include detailed figures of the genitalia of both sexes of *pygmaea* (Figs. 1, 2) here, although the figures of Needham & Claassen are reasonably accurate and usable. Specific characters to be noted are: a bilobed median process near the posterior margin of the eighth abdominal tergite of the male; no process present on the seventh tergite; a bulbous knob at the tip of the sheath of the supraanal process; eighth sternite of female with a broad median section expanding apically toward a broad, truncate or slightly arcuate, posterior margin.

As mentioned above, a critical restudy of the type of *pygmaea* in Germany will be necessary for the final settlement of this problem. It is possible that the type of *pygmaea* is conspecific with the lectotype of *nivicola* since Needham & Claassen may have missed the criteria of distinction between the two species. For the present however we must accept the judgment of these workers who are the only ones to have critically studied the genitalia of the type male.

I have studied paratypes of *A. torontonensis* Ricker and agree with Frison in placing this species as a synonym of *pygmaea* although it is not conspecific with the species (*A. nivicola*) that Frison has recently been placing as *pygmaea*.

*Allocapnia nivicola* (Fitch).

1847. *Perla nivicola* Fitch ♂ ♀, Amer. Jour. Agr. and Sci., 5: 278.
1861. *Capnia pygmaea* in part, Hagen, Syn. Neur. North America, p. 32 (*Perla nivicola* Fitch synonymized).
1942. Hanson, Bull. Brooklyn Ent. Soc., 37: 83-86, figs. 2, 4 of ♂ ♀ (*P. nivicola* removed from synonymy and redescribed).
1942. *A. pygmaea* in part (♂), Frison, Bull. Ill. Nat. Hist. Survey, 22(2): 265-268, fig. 33 of ♂ (selection of lectotype ♂ and synonymy of *A. nivicola* under *A. pygmaea*). *New Synonymy*.

Frison (1942b, p. 266) has shown that the cotypes of *Allocapnia nivicola* (Fitch) deposited in the U. S. National Museum and in the Museum of Comparative Zoology at Cambridge represent several species. He has therefore appropriately selected a male type, which is in the M.C.Z., as lectotype. Since my studies of *nivicola* are based on this same specimen, the selection of it as lectotype by Frison definitely establishes the identity of *nivicola* as the species described in Part III of this series of articles.

In contrast to the diagnostic specific characters mentioned for *A. pygmaea*, *A. nivicola* may be characterized as follows: (1) a trilobed rather than a bilobed process near the middle of the eighth abdominal tergite of the male; (2) a small transverse process present on the seventh tergite; (3) no bulbous knob at the tip of the sheath of the supraanal process; (4) eighth sternite of female with a strongly chitinized, truncate, median projection. That the correlation of sexes is correct in this case and is not confused with the closely related *A. pygmaea* (Burm.) is certain, since the two

species only infrequently occur in the same habitat and I have studied hundreds of specimens of each species. On the basis of the above considerations I again withdraw *A. nivicola* (Fitch) from its recent synonymy under *A. pygmaea* (Burm.) and restore it to the rank of a valid species.

### *Capnia.*

Most of the described species of *Capnia* are confined to North America. Supposedly only one of these, *Capnia opis*, occurs east of the Rocky Mountains. Actually, however, *opis* is not a *Capnia*. Along with another species to be described later as new it belongs in an entirely distinct new genus. A discussion of this new genus will be published in a paper already prepared concerning the comparative morphology of the entire family Capniidae.

The status of the only two eastern species, described in the genus *Capnia*, *C. opis* and *C. vernalis* is still an open question. In 1938 Ricker published notes on these species after a study of the types in England. As Frison has pointed out (1942b), however, Ricker's comments are a bit inconsistent. He maintains that *opis* is identical with *vernalis* as used by Needham & Claassen and that the types of *vernalis* represent another species. However he figures the genitalia of the male type of the latter species and it is unquestionably the same as what Needham & Claassen considered to be *vernalis*. Therefore, if he is correct in placing *vernalis* as used by Needham & Claassen under *opis*, there remains only one valid eastern species of *Capnia*. This latter view has been adopted by Frison (1942b) and I am inclined to agree with him, but for different reasons. Frison synonymizes *vernalis* under *opis* on the basis of never having found more than one species in all the material he has studied. However, since I find that I have another, distinct, apparently undescribed species in my collection, the synonymy of the above-mentioned species on this basis is precluded. Until the male type of *opis* is prepared for study and accurately figured the best basis for the current usage of this specific name is the short-winged condition of the male reported by Ricker for the type specimen. The several male specimens that I have of the unnamed species are all fully winged while the numerous specimens of *opis* that have been studied nearly always exhibit some extent of brachyptery.

*Isocapnia grandis* (Banks). Figs. 3, 4, 5.

1907. *Arsapnia grandis* Banks ♂ ♀, Can. Ent., 39: 329.

1925. *Capnia*, Needham & Claassen, *Plecopt. Amer. North of Mex.*, pp. 259-260, Plate 48. fig. 6.
1937. *Capnia fumigata* Claassen, *Can. Ent.*, 69: 79, figs. 4, 7. *New Synonymy.*
1938. Banks, *Psyche*, 45: 73.
1938. *fumosa* Banks, *Psyche*, 45: 74, fig. 3. *New Synonymy.*
1942. Frison, *Pan-Pacific Ent.*, 18: 69 (♂ cotype selected as lectotype).
1942. *fumigata*, Frison, *ibid.*, pp. 70-71, figs. 12, 15 (*I. fumosa* synonymized under *I. fumigata*). *New Synonymy.*

*Isocapnia grandis* was described by Banks from a male specimen from Victoria, B. C., and a female from Banff, Alberta. As has been mentioned by Frison, these two specimens, due to their widely separated points of collection, may very well not be conspecific. I am convinced that they are not conspecific (see discussion under *I. integra* n. sp.).

Claassen (1937) has noted and Frison (1942a) has agreed that the males of *fumigata* and *grandis* appear very similar to each other. Claassen states that the supraanal process of *fumigata* is shorter and a little more slender than that of *grandis*. However, the distinction as stated does not exist. In the male types of both species the supraanal processes are identical in length and curvature. In both specimens the supraanal process is a thin curved structure nearly two and one-half times as long as the bulbous base from which it arises. A careful comparison of the male types of both species also shows them to be identical in all other genitalic features as well as in size, coloration, and wing venation. *I. fumigata* (Claassen) must therefore be considered to be synonymous with *I. grandis* (Banks).

The fact that the two female types of *fumosa* and the one of *fumigata* are identical in features of the eighth sternite and were all collected within a radius of fifteen miles of one another is quite conclusive evidence of their conspecificity (Frison, 1942a). The name *I. fumosa* Banks must therefore also be placed as a synonym of *I. grandis* (Banks).

Since the types of *fumigata* consist of a male and two females taken at the same time and place, the correlation of the sexes is most probably correct. Since it is known that the original female type specimen of *I. grandis* is not conspecific with the lectotype male of the species, it is best that the female types of *fumigata* (Claassen) be used as the basis of description of the female sex of *I. grandis* (Fig. 5).

*Isocapnia crinita* (Needham & Claassen).

1925. *Capnia crinita* N. & Clsn. ♀, Plecop. Amer. North of Mex., pp. 269-270, fig. of wings.

1938. *Isocapnia* Banks, Psyche, 45: 73.

1942. Frison, Pan-Pacific Ent., 18: 69-70, fig. 14a.

In their monograph (1925) Needham & Claassen did not figure the eighth sternite of the monotypic female, nor did they adequately describe it. In a recent paper (1942a) Frison has figured the eighth sternite of this specimen which is in alcohol and is now badly bleached. Its faded condition apparently led Frison to misinterpret the structure and coloration of the eighth sternite. Actually it is identical with that of *I. grandis* in structure (Fig. 5); and if carefully observed, the color pattern, though faded, can be seen to be the same also. It is very probable that this species is a synonym of *I. grandis*, but further collecting of both males and females from the type locality (Bozeman, Montana) or from nearby regions would seem advisable before a definite designation of synonymy is made.

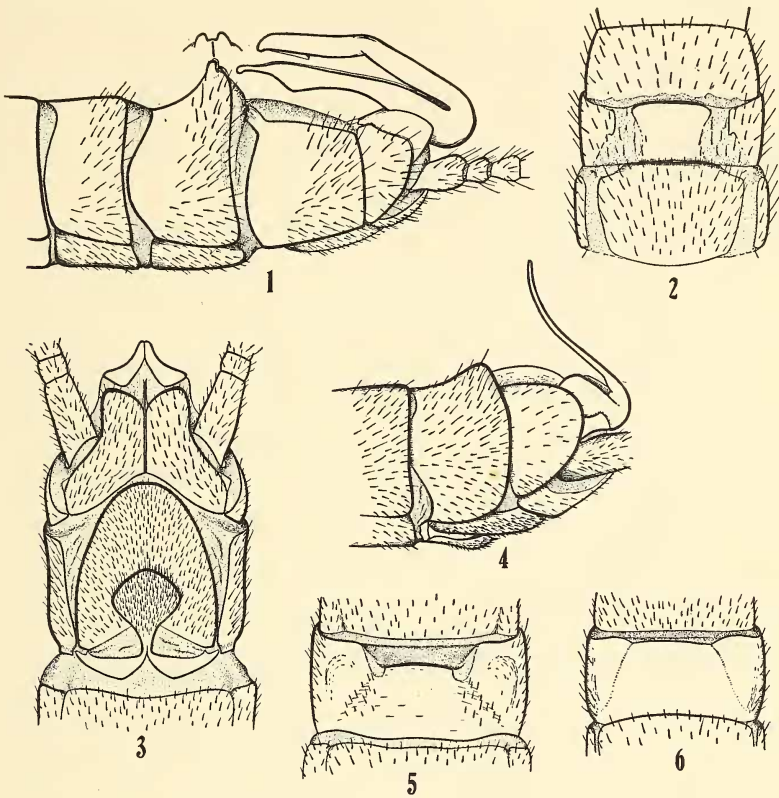
*Isocapnia integra* n. sp. Fig. 6.

1907. *Arsapnia grandis* Banks in part (♀), Can. Ent., 39: 329.

1942. ? *Isocapnia crinita*, Frison, Pan-Pacific Ent., 18: 70, fig. 14b.

The description of this species is based on two female specimens from Banff, Alberta. One of these is the female type of *I. grandis*. Of the two species of *Isocapnia* described to date the female of only one, *I. grandis*, is known. The latter species is easily distinguishable from *I. integra* by differences in the eighth sternite (see Figs. 5 and 6). In *I. grandis* (Banks) the genital opening is well anterior to the posterior margin of the eighth sternite. In *I. integra* it opens directly on the posterior margin of the segment. The two type specimens of this species are very noticeably smaller than the females of *I. grandis* and are even smaller than the male sex of *grandis*. It is very probable that the female and two male specimens that Frison (1942a, p. 70) assigns to *I. crinita* are referable to *I. integra*.

The only other species with which *I. integra* might possibly be correlated is the recently described *I. abbreviata* Frison. However, the localities of collection of these two species are widely separated and such a correlation would be purely conjectural. Therefore, and since Frison (1942) has selected the original male type of



EXPLANATION OF PLATE.

- Figure 1. *Allocapnia pygmaea* (Burmeister), lateral view of genitalia of male plesiotype.  
Figure 2. *Allocapnia pygmaea* (Burmeister), ventral view of genitalia of female plesiotype.  
Figure 3. *Isocapnia grandis* (Banks), male genitalia in ventral view.  
Figure 4. *Isocapnia grandis* (Banks), male genitalia in lateral view.  
Figure 5. *Isocapnia grandis* (Banks), female genitalia in ventral view.  
Figure 6. *Isocapnia integra* n. sp., female genitalia in ventral view.

*grandis* as lectotype, the safest procedure seems to be to describe the female type of *grandis* as a new species.

*Female*: Length to tip of wings 13 mm.; length of body, 10 mm.; length of fore wing 11 mm.

Eighth sternite glabrous, transverse, slightly convex. With the median third of its posterior margin modified to form a broad and slightly arcuate region (Fig. 6).

All other morphological details of head, thorax, and abdomen are identical to those of the type of the genus, *Isocapnia grandis* (Banks).

COLLECTION DATA: *Holotype* female—"Banff, Alberta, June 17, 1901" (cotype of *I. grandis*, deposited in the Museum of Comparative Zoology in Cambridge). *Paratopotype* female—"Banff, Alberta, June 22, 1908 (J. C. Bradley)" (deposited in the collection of Cornell University at Ithaca). The holotype is a pinned specimen the genitalia of which I have mounted on a slide. The wings of the paratype specimen, which is also mounted on a slide, are missing.

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**A novel method of collecting dragonfly nymphs** chanced upon during the summer of 1941 may prove of no practical value to collectors but afforded me an amusing evening and helped pass the insufferably hot hours of an unusually hot Arizona night.

While collecting Lepidoptera at night at the Boyce Thompson Arboretum for Plant Research at Superior, Arizona, a gasoline lantern was placed on the dam at the foot of the reservoir. Dragonfly nymphs were noticed swimming in numbers within the circle of light cast on the water and were easily captured with the butterfly net which was lying at hand. It was then found that they could be attracted equally well by an ordinary flashlight directed into the water.

Specimens of *Anax junius*, *Aeschna multicolor* and *Argia vivida* came in such numbers that I soon tired of the sport and failed to find out if the absence of nymphs of *Enallagma praevarum* and *Ischnura barberi* which were abundant in my sieve net collecting the previous day was significant. The point on the dam where the light was displayed was some 30 feet from the weedy shore where my other collections were made but the walls were covered with the cast skins of all of the species.—ELSIE BROUGHTON KLOTS, Mount Vernon, N. Y.